

Bridge Rock Scour Analysis Protocol

Introduction

The overall responsibility for this procedure resides with the State Drainage Engineer (Rick Renna) with support from the State Geotech Engineer (Larry Jones) and State Materials Office (Dr. Dave Horhota). Currently, OEA (Dr. Max Sheppard) is tasked with the analysis of RETA results to predict rock and clay scour. Thus, the State Drainage Engineer will be ensuring that this protocol is carried out to provide timely and sound results to the districts.

Currently, our analysis approach is very conservative. Ultimately as we gain more experience, some lower level of conservatism will be targeted and the procedure formalized to be palatable for district and consultant usage. When this procedure is released from Central Office, the first step would be for the District Geotechnical Engineer (DGE) and District Drainage Engineer (DDrE) to analyze the RETA results to formulate scour prediction; later, consultants would be charged with this analysis and decision.

Research is underway to better understand the correlation between typical geotechnical test properties and scour resistance. For now, the following conditions, at the location of interest, should be considered as evidence that scour-resistant materials soils may be present and should be investigated with this procedure:

- Boring log description of lenses known to be cemented such as cemented limestone, coquina, etc.
- Historical bridge pile driving records indicating hard materials.

Initiation of Procedure

DDrE contacts State Drainage Engineer with potential bridge rock scour case because indurated materials, per the above discussion, were found or are expected between the mud line and the scour elevation.

- Deliverables from DDrE: bridge location, bridge channel plans with piers, design flow data (stage and velocity for Q50, 100, 500)
- Action: State Drainage Engineer sends information to State Geotechnical Engineer, State Materials Office, and OEA

Decision on the Location and Number of Required Borings

State Drainage Engineer will set a meeting (typically a conference call) with State Geotechnical Engineer, State Materials Office, & OEA.

- Timing: target 1 week, but with flexibility for schedules
- Note: typically one core per pier for local scour, contraction scour more complicated
- Action: State Drainage Engineer sends boring request to the DDrE with copy to State Geotechnical Engineer and DGE

Receipt and Analysis of Borings

All project cores (not just rock scour cores) and boring logs sent directly to State Materials Office by the DGE or geotechnical consultant after samples for strength tests have been selected. A copy of the transmittal letter is to be emailed to the State Drainage Engineer and to OEA. If strength tests have been completed, include the pieces of the tested core.

- Action: SMO runs RETA tests on representative samples
- Timing: RETA tests complete within 3 weeks
- Deliverables: State Materials Office sends test results to OEA with copy to State Drainage Engineer & State Geotechnical Engineer. If something is unusual about the cores or geotechnical information, State Materials Office will alert all.
- Note: OEA may elect to inspect cores at the SMO

Prediction of Design Scour

- OEA decides with State Materials Office, State Geotechnical Engineer, and State Drainage Engineer what level of and time frame of quantitative analysis is needed. If more borings are needed, State Materials Office will contact the DGE. If more flow information is needed, OEA or State Drainage Engineer will contact the district.
- State Drainage Engineer communicates approach to the DDrE and works out contractual arrangements: Districts pay if possible, State Drainage Engineer pays otherwise.
- OEA sends draft scour report to State Drainage Engineer, State Materials Office, State Geotechnical Engineer, the DDrE, and the DGE for review (2 week review time).
- OEA addresses comments and sends final signed and sealed report to DDrE with e-copies to State Geotechnical Engineer, State Materials Office, State Drainage Engineer, and the DGE (2 weeks turn around). State Geotechnical Engineer will let OEA know if a hard copy is needed for the CO Structures files.

| Rock Scour Procedure Time Line | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
| Weeks After Initiation | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| Task | | | | | | | | | | | | | | | | | | |
| 1. DDrE contacts CO - information to others | █ | | | | | | | | | | | | | | | | | |
| 2. Decision and response to the district on location of borings | | █ | | | | | | | | | | | | | | | | |
| 3. Districts obtain borings and send to the SMO | | | █ | █ | █ | █ | █ | | | | | | | | | | | |
| 4. RETA tests completed | | | | | | | █ | █ | █ | █ | | | | | | | | |
| 5. Decision on level of analysis required | | | | | | | | | | █ | | | | | | | | |
| 6. Scour prediction analysis performed | | | | | | | | | | | █ | █ | █ | | | | | |
| 7. Draft report | | | | | | | | | | | | █ | █ | █ | █ | | | |
| 8. Draft report review | | | | | | | | | | | | | | | | █ | █ | █ |
| 9. Final report | | | | | | | | | | | | | | | | | | █ |
| Maximum Procedure Duration = 18 weeks | | | | | | | | | | | | | | | | | | |